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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/511,227	05/24/2005	Erwan Pincemin	5284-46PUS	2078
27799 7590 10/26/2007 COHEN, PONTANI, LIEBERMAN & PAVANE 551 FIFTH AVENUE SUITE 1210 NEW YORK, NY 10176			EXAMINER LIU, LI	
			ART UNIT 2613	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/511,227	<b>Applicant(s)</b> PINCEMIN, ERWAN	
	<b>Examiner</b> Li Liu	<b>Art Unit</b> 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 12 October 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/12/04, 5/24/05</u> | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement (IDS) submitted on 10/12/2004 and 5/24/2005 are being considered by the examiner.

### ***Claim Objections***

2. Claim 9 is objected to because of the following informalities: page 8, claim 9, line 4, "according to claim 1 or 2" should be changed to "according to claim 1". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 4, 5, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al (US 2002/0126346) in view of Hatami-Hanza et al (Hatami-Hanza et al: "Demonstration of All-Optical Demultiplexing of a Multilevel Soliton Signal Employing Soliton Decomposition and Self-Frequency Shift", IEEE Photonics Technology Letters, Vol. 9, No. 6, July 1997, pages 833-835) and Sugawara (US 2003/0058500).

1). With regard to claims 1 and 9, Suzuki et al discloses an optical device and a method (e.g., Figure 1) for converting WDM signals (e.g., four wavelengths in Figures 1 and 3), the pulses of which are simultaneous and carried by different wavelengths ( $\lambda_1$ ,  $\lambda_2$ ,  $\lambda_3$ ,  $\lambda_4$  in Figures 1 and 3), into an OTDM signal (Figures 1 and 3, OTDM signal is outputted from the O-BPF 30), the components of which are carried by the same wavelength ( $\lambda_5$ , in Figures 1 and 3; in Suzuki et al's system,  $\lambda_5$  is as the outputted wavelength for the OTDM signal, however, Suzuki et al also states that other wavelength same as the input light can also be used, page 3, [0041]) and time shifted (the Delay device 14-1 to 14-4 delay the optical signals), which device comprises:

shifting means (the Delay device 14-1 to 14-4 in Figures 1 and 3) adapted to introduce a time shift between the pulses of the WDM signals carried by the optical carriers,

an optical spectral and temporal multiplexer/demultiplexer (the multiplexer 16 in Figures 1 and 3).

But, Suzuki et al uses an absorption type optical modulator (20 in Figure 1) as a wavelength converter. Suzuki et al does not expressly disclose (A) modulation means adapted to modify the optical power of the WDM signals, (B) a birefringent propagation medium (130) into which the WDM signals are injected in such a manner as to achieve a soliton trapping phenomenon, and (C) absorption means adapted to introduce optical losses into the components of the OTDM signal.

With regard to items (A) and (B), however, Hatami-Hanza et al discloses a system and method to convert the OTDM signal to a WDM signal (Figure 1). Hatami-

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Hanza et al teaches modulation means (the attenuators Att.1 to Att.4 in Figure 1) adapted to modify the optical power of the OTDM signals, (B) a birefringent propagation medium (the Fiber Spans in Figure 1) into which the OTDM signals are injected in such a manner as to achieve a soliton trapping phenomenon (page 834, Figure 2). Although, Hatami-Hanza et al teaches the conversion from the OTDM signals to WDM signals, it is obvious that same system can be used to convert the WDM signals to the OTDM signals since the basic principle is the same.

Hatami-Hanza et al teaches a simplified WDM/OTDM multiplexing/demultiplexing system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the multilevel soliton method and a birefringent propagation medium as taught by Hatami-Hanza et al to the system of Suzuki et al so that a simplified WDM/OTDM conversion system can be obtained.

With regard to item (C), the absorption means adapted to equalize the powers of the optical pulses is well known and widely used in the art. Sugawara teaches a system and method (Figures 7 and 8) in which the optical pulses are reshaped so that each pulse has substantially same power.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the power equalizing means as taught by Sugawara to the system of Suzuki et al and Hatami-Hanza et al so that each OTDM pulse has substantially the same intensity and then the system is more uniform and more reliable, and the jitter, noise and variation in the intensity etc can be reduced.

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2). With regard to claim 4, Suzuki et al and Hatami-Hanza et al and Sugawara disclose all of the subject matter as applied to claim 1 above. And Suzuki et al and Hatami-Hanza et al further disclose that the shifting means comprise variable delay lines (Suzuki et al: page 4, [0044]; or Hatami-Hanza et al: page 833 right column, II. Experimental Results)

3). With regard to claim 5, Suzuki et al and Hatami-Hanza et al and Sugawara disclose all of the subject matter as applied to claim 1 above. And Hatami-Hanza et al further disclose the modulation means comprise variable attenuators (page 834, left column).

3). With regard to claim 8, Suzuki et al and Hatami-Hanza et al and Sugawara and Horiuchi et al disclose all of the subject matter as applied to claims 1 and 2 above. And Suzuki et al and Hatami-Hanza et al and Sugawara and Horiuchi et al further disclose that the absorption means comprise a saturable absorber (Sugawara teaches a saturable absorber).

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al and Hatami-Hanza et al and Sugawara as applied to claim 1 above, and in further view of Horiuchi et al (US 5,726,789).

Suzuki et al and Hatami-Hanza et al and Sugawara disclose all of the subject matter as applied to claim 1 above. But, Suzuki et al and Hatami-Hanza et al and Sugawara does not expressly disclose the absorption means comprise an electro-absorption modulator.

However, to use the electro-absorption modulator (EAM or MEA) to reshape an optical pulse is well known in the art. It is well known that the intensity of the pulse outputted from an EAM (or MEA) depends on the applied electric voltage. Horiuchi et al teaches such EAM; and in Figures 6, 11 and 12, Horiuchi et al shows how the intensity of the outputted pulses varies with the control signals (the sinusoidal voltage in Figure 6, or the signal shown in Fig 11(b)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use an electro-absorption modulator as widely used in the art to the system of Suzuki et al and Hatami-Hanza et al so that a simplified power control device and WDM/OTDM conversion system can be obtained.

6. Claims 2-5, 7, 10 and 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al (US 2002/0126346) in view of Hatami-Hanza et al (Hatami-Hanza et al: "Demonstration of All-Optical Demultiplexing of a Multilevel Soliton Signal Employing Soliton Decomposition and Self-Frequency Shift", IEEE Photonics Technology Letters, Vol. 9, No. 6, July 1997, pages 833-835) and Horiuchi et al (US 5,726,789).

1). With regard to claims 2 and 10, Suzuki et al discloses an optical device and a method (e.g., Figures 4 and 6) for converting an OTDM signal whose components are time shifted (Figures 1 and 3, the Delay device 14-1 to 14-4 delay the optical signals) and carried by the same wavelength ( $\lambda_5$ , in Figures 1 and 3; in Suzuki et al's system,  $\lambda_5$  is as the outputted wavelength for the OTDM signal, however, Suzuki et al also states that other wavelength same as the input light can also be used, page 3, [0041]) into

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WDM signals (Figures 4 and 6, the output from "C" of the circulator 42 is the WDM signals) whose pulses are carried by different wavelengths ( $\lambda_1$ ,  $\lambda_2$ ,  $\lambda_3$ ,  $\lambda_4$ , Figures 4 and 6), which device comprises:

wavelength converter (the combination of 44, 46, 48 and 50 etc in Figures 4 and 6),

an optical spectral and temporal multiplexer/demultiplexer (Demultiplexer 56 in Figures 4 and 6).

But, Suzuki et al uses an absorption type optical modulator (44, 46, 48 and 50 etc in Figures 4 and 6) as a wavelength converter. Suzuki et al does not expressly disclose (A) absorption means adapted to introduce optical losses into the components of the OTDM signal, (B) a birefringent propagation medium into which the OTDM signal is injected in such a manner as to achieve a soliton trapping phenomenon, (C) modulation means adapted to modify the optical power of the WDM signals.

With regard to items (A) and (B), Hatami-Hanza et al discloses a system and method to convert the OTDM signal into a WDM signal (Figure 1). Hatami-Hanza et al teaches absorption means (the attenuators Att.1 to Att.4 in Figure 1) adapted to introduce optical losses into the components of the OTDM signal, and a birefringent propagation medium (the Fiber Spans in Figure 1) into which the OTDM signal is injected in such a manner as to achieve a soliton trapping phenomenon (page 834, Figure 2).

Hatami-Hanza et al teaches a simplified WDM/OTDM multiplexing/demultiplexing system. Therefore, it would have been obvious to one of ordinary skill in the art at the

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time the invention was made to apply the multilevel soliton method and a birefringent propagation medium as taught by Hatami-Hanza et al to the system of Suzuki et al so that a simplified WDM/OTDM conversion system can be obtained.

But, in Hatami-Hanza et al's system, four attenuators are used to control the power of the individual pulse. Hatami-Hanza et al does not expressly teach to use a single device to control the power of the individual pulse of the OTDM signal. However, to use a single device, such as the electro-absorption modulator (EAM or MEA), to reshape an optical pulse is well known in the art. It is well known that the intensity of the pulse outputted from an EAM (or MEA) depends on the applied electric voltage. Horiuchi et al teaches such EAM; and in Figures 6, 11 and 12, Horiuchi et al shows how the intensity of the outputted pulses varies with the control signals (the sinusoidal voltage in Figure 6, or the signal shown in Fig 11(b)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use an electro-absorption modulator as widely used in the art to the system of Suzuki et al and Hatami-Hanza et al so that a simplified power control device and WDM/OTDM conversion system can be obtained.

With regard to item (C), modulation means, such as the variable optical attenuator, to modify the optical power of the WDM signals is well known and widely used in the art. In Figure 1 of Hatami-Hanza et al, attenuators are used to adjust the power of different channels, it is obvious that the same attenuators can be used in the receiver side for the WDM signals, so that the desired power of the different wavelength can be obtained.

2). With regard to claims 3 and 11, Suzuki et al and Hatami-Hanza et al and Horiuchi et al disclose all of the subject matter as applied to claim 2 above. But, Suzuki et al and Hatami-Hanza et al and Horiuchi et al do not expressly disclose shifting means adapted to introduce a time shift between the pulses of the WDM signals carried by the optical carriers. However, Suzuki et al teaches shifting means adapted to introduce a time shift between the pulses of the WDM signals in the transmitter side for WDM to OTDM conversion, it is obvious that the same shifting means can be used in the receiver side for the WDM signals after the OTDM to WDM conversion.

4). With regard to claim 4, Suzuki et al and Hatami-Hanza et al and Horiuchi et al disclose all of the subject matter as applied to claim 2 above. And Suzuki et al and Hatami-Hanza et al further disclose that the shifting means comprise variable delay lines (Suzuki et al: page 4, [0044]; or Hatami-Hanza et al: page 833 right column, II. Experimental Results)

5). With regard to claim 5, Suzuki et al and Hatami-Hanza et al and Horiuchi et al disclose all of the subject matter as applied to claim 2 above. And Hatami-Hanza et al further disclose the modulation means comprise variable attenuators (page 834, left column).

6). With regard to claim 7, Suzuki et al and Hatami-Hanza et al and Horiuchi et al disclose all of the subject matter as applied to claim 2 above. And Suzuki et al and Hatami-Hanza et al and Horiuchi et al further disclose that the absorption means comprise an electro-absorption modulator (Horiuchi et al: EAM is used as pulse reshaping).

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7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al and Hatami-Hanza et al and Horiuchi et al as applied to claim 2 above, and in further view of Sugawara (US 2003/0058500).

Suzuki et al and Hatami-Hanza et al and Horiuchi et al disclose all of the subject matter as applied to claim 2 above. But, Suzuki et al and Hatami-Hanza et al and Horiuchi et al do not expressly disclose that the absorption means comprise a saturable absorber.

However, the absorption means used to equalize the powers of the optical pulses is well known and widely used in the art. Sugawara teaches a system and method (Figures 7 and 8) in which the optical pulses are reshaped so that each pulse has substantially same power.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the power equalizing means as taught by Sugawara to the system of Suzuki et al and Hatami-Hanza et al so that each OTDM pulse has substantially the same intensity and then the system is more uniform and more reliable, and the jitter, noise and variation in the intensity etc can be reduced.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al and Hatami-Hanza et al and Sugawara and Horiuchi et al as applied to claims 1 and 2 above, and in further view of Islam et al (Islam et al: "Soliton Trapping in Birefringent Optical Fibers", Optics Letters, September 15, 1989, pages 1011-1013).

Suzuki et al and Hatami-Hanza et al and Sugawara and Horiuchi et al disclose all of the subject matter as applied to claims 1 and 2 above. But, Suzuki et al and Hatami-

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Hanza et al does not disclose that the system further comprises a polarization controller at the entry of the birefringent propagation medium (130) to encourage the injection of WDM/OTDM signals into said propagation medium with a polarization at 45 degree to its main axes.

However, Islam et al teaches system for soliton trapping in birefringent optical fiber; and the optical signal is injected into the birefringent optical fiber with a polarization at 45 degree to its main axes (Figures 1 and 2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the injection of the optical signal with 45 degree along the principle axis as taught by Islam et al to the system of Suzuki et al and Hatami-Hanza et al and Sugawara and Horiuchi et al so that a desired soliton trapping and wavelength shift can be obtained.

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Wachsman (US 6,614,583).

Suzuki et al (US 5,889,607).

Reingand et al (US 2003/0058490).

Olsson et al: "WDM to OTDM Multiplexing Using an Ultrafast All-Optical Wavelength Converter", IEEE Photonics Technology Letters, Vol. 13, No. 9, September 2001, pages 1005-1007.

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10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li Liu whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Li Liu  
October 23, 2007

  
KENNETH VANDERPUYE  
SUPERVISORY PATENT EXAMINER